INTERNATIONAL CIVIL AVIATION ORGANIZATION
EASTERN AND SOUTHERN OFFICE

First Meeting of the AFI VSAT Networks Managers (AFI VSAT/1)
(Kwa-Zulu Natal, South Africa, 13 to 15 June 2011)

Agenda Item 2e: Interconnection with Other Networks

INTERCONNECTION AND INTEROPERABILITY BETWEEN VSAT NETWORKS

(Presented by ATNS)

SUMMARY

This working paper provides information on the methodology followed to interconnect the SADC VSAT II, NAFISAT and AFISNET VSAT network infrastructures.

REFERENCE(S)

1. INTRODUCTION

1.1. It is a well established fact that different type of VSAT networks exist within the SAT, AFI, SAM and adjacent regions for the implementation and support of aeronautical fixed communications. These VSAT satellite networks use different satellites, different satellite access techniques and operating modes for establishing the communication links for the different aeronautical services as required.

1.2. The 11th Air Navigation Conference held in Montreal in 2003 considered the terms **"interoperability"** and **"seamless"** which are often used when describing future air traffic management systems. When doing so, a common understanding of these notions is not always obvious or fully comprehended by all. The Air Traffic Management Operational Concept Panel (ATMPC) identified the following working terms for use towards development of the ATM operational concept.

1.3. **Interoperability** within the ATM system might be described as the ability to transfer information, or effect functionality, across any discontinuity, in order to enable operations; and

1.4. **Seamless** within the ATM system might be described as the property that would allow a transition across any discontinuity which, from the perspective of the transiting agent, did not require a considered action to facilitate transition. It should be noted that, in this context, **seamless** did not imply ATM systems converge into **singleness**.

1.5. The conference identified that highly prescriptive standards to achieve **"interoperability"** and **"seamless"** may be beneficial for a limited number of systems, but will have a negative effect on the global aviation systems if it were applied across all systems. Excessive

prescriptively-defined standards should be avoided and there should be a balance to accommodate existing systems while ensuring that emerging systems and new technological solutions can be integrated into the air navigation infrastructure.

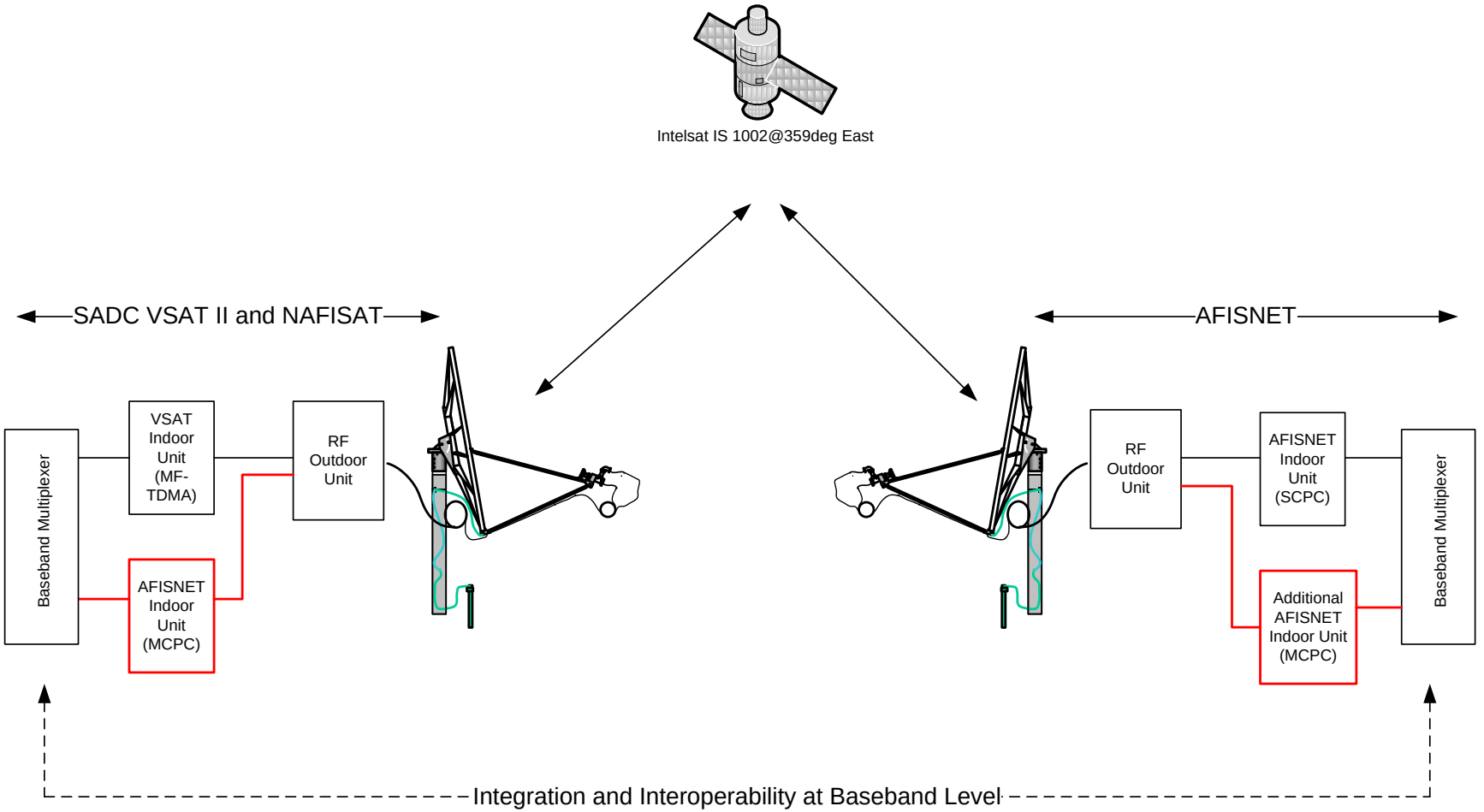
1.6. The AFI VSAT Network Integration Meeting held in Johannesburg during the period 31 March to 1 April 2004 established the foundation for integration and interoperability between the SADC VSAT II, NAFISAT and AFISNET VSAT networks. This meeting identified the need for consideration of integration and interoperability aspects at regional and/or interregional level between the network managers and the space segment provider(s).

2. DISCUSSION

2.1. ASECNA completed migrating the AFISNET network to the East Hemi (EH) transponder 20/20 on the INTELSAT IS-1002 satellite at 359°E during 2006. Due to spectrum not being available on this transponder, ATNS contracted during 2006 for a lease of satellite spectrum on the same satellite, but on the East Hemi (EH) transponder 23/23 for the implementation of the SADC VSAT II and NAFISAT VSAT networks.

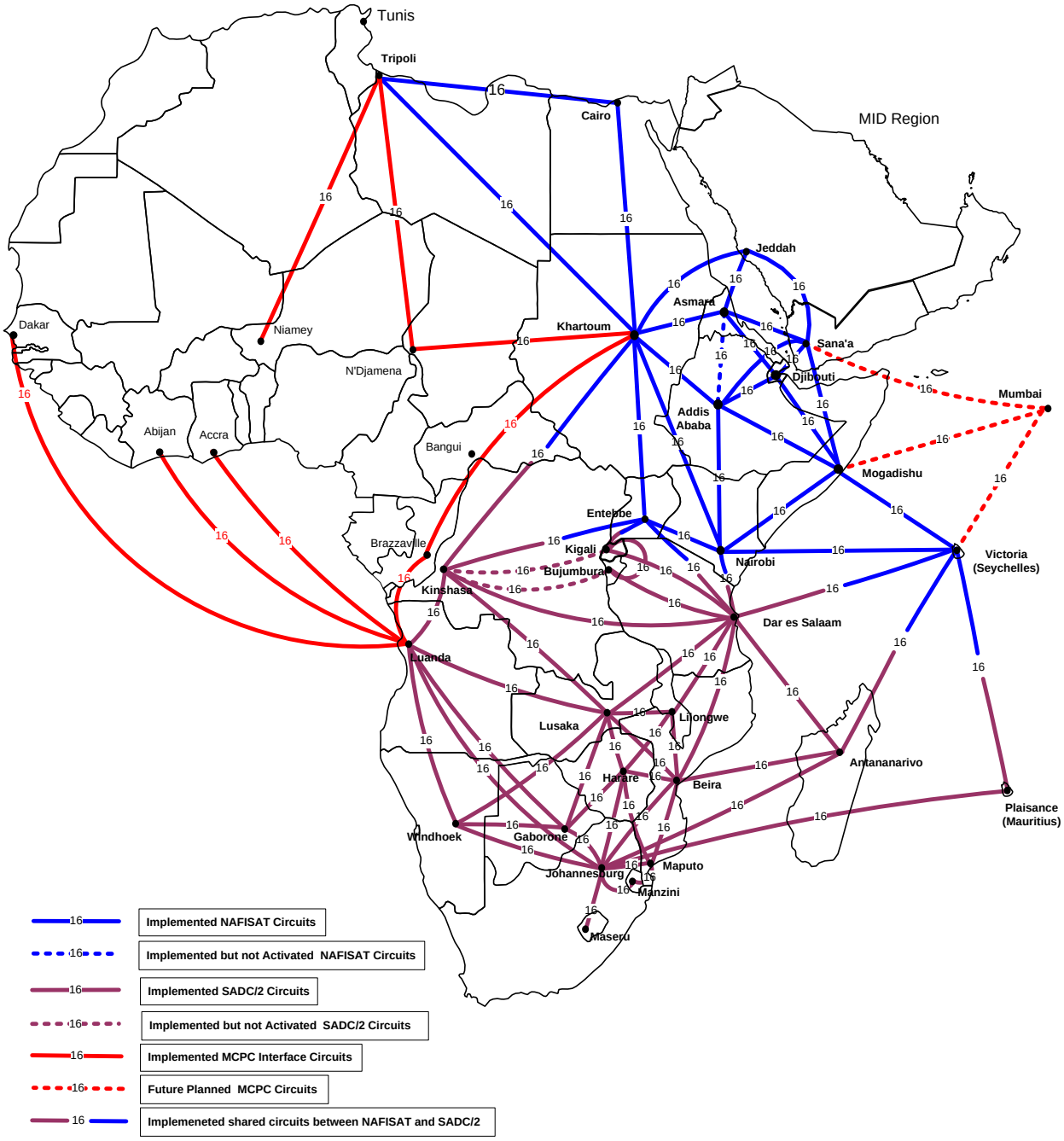
2.2. During 2007 ATNS and ASECNA agreed on a VSAT network integration model based on interoperability at baseband level of the two networks. As all three networks were being operated on the same satellite, the most cost effective basis of integration was to establish individual MCPC (Multi Channel per Carrier) access links between the different networks at access points as identified in the AFI Plan.

2.3. The diagram on the following page shows the VSAT integration model as applicable.


Intelsat IS 1002@359deg East
SADC VSAT II and NAFISAT
AFISNET
Baseband Multiplexer
VSAT Indoor Unit (MF-TDMA)
AFISNET Indoor Unit (MCPC)
RF Outdoor Unit
RF Outdoor Unit
AFISNET Indoor Unit (SCPC)
Additional AFISNET Indoor Unit (MCPC)
Baseband Multiplexer
Integration and Interoperability at Baseband Level

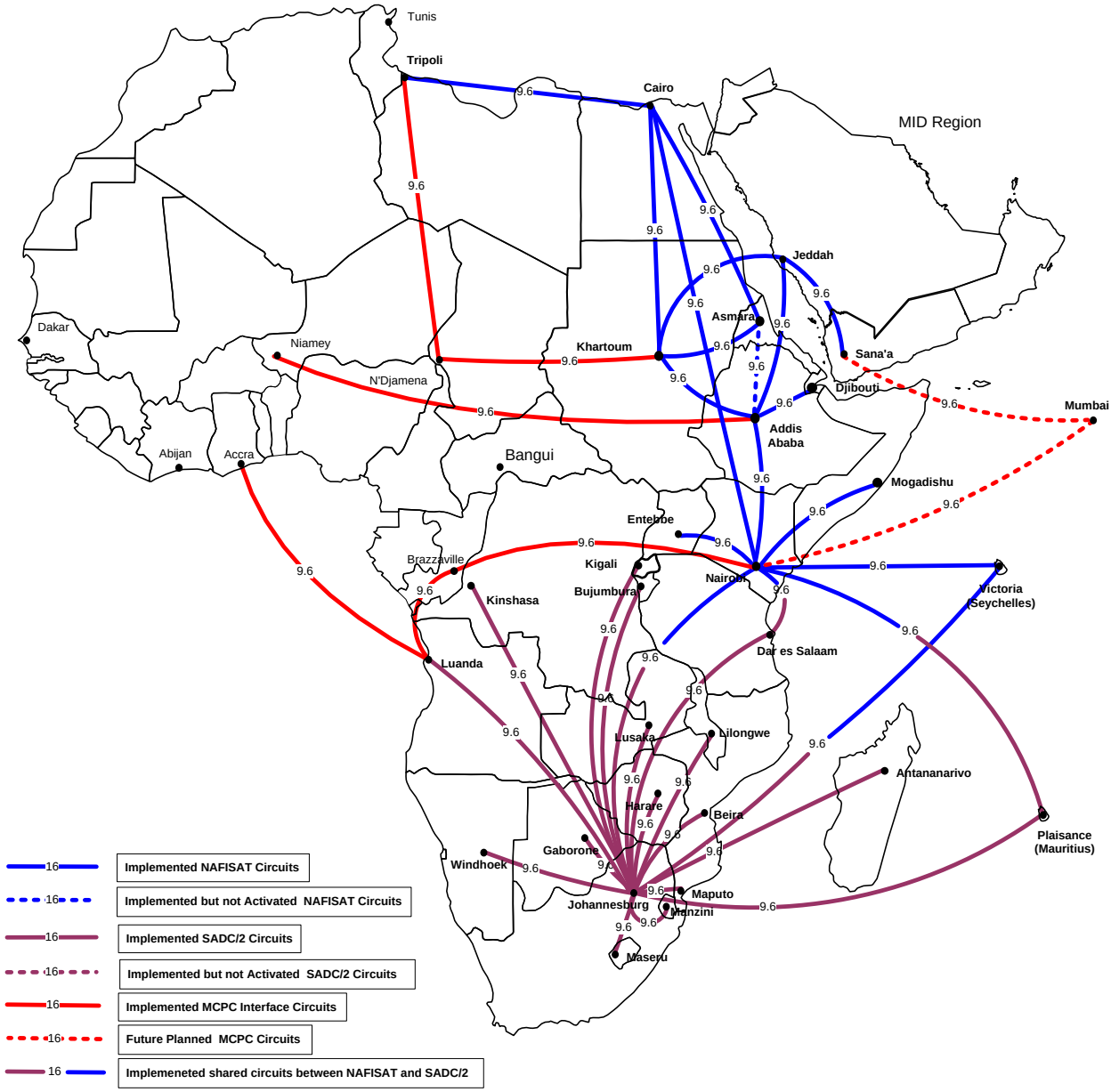
2.4. The diagram below shows the level of interoperability achieved for the ATS/DS voice circuits between the SADC VSAT II, NAFISAT and AFISNET VSAT networks.

ATNS VSAT NETWORK:
NAFISAT and SADC VSAT II - ATS/DS Connectivity



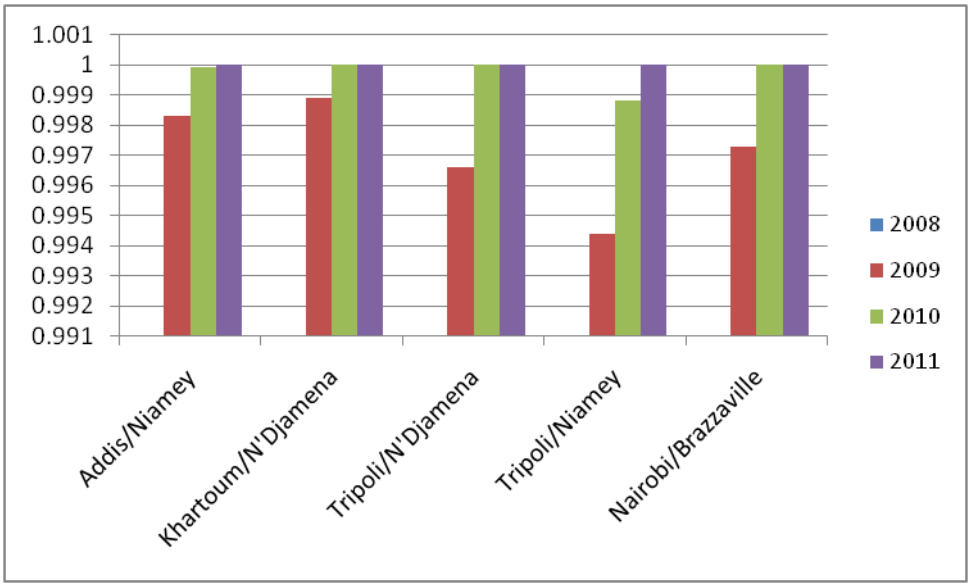
2.5. The diagram below shows the level of interoperability achieved for the AFTN data circuits between the SADC VSAT II, NAFISAT and AFISNET VSAT networks.

ATNS VSAT NETWORK
NAFISAT and SADC VSAT II - AFTN Connectivity



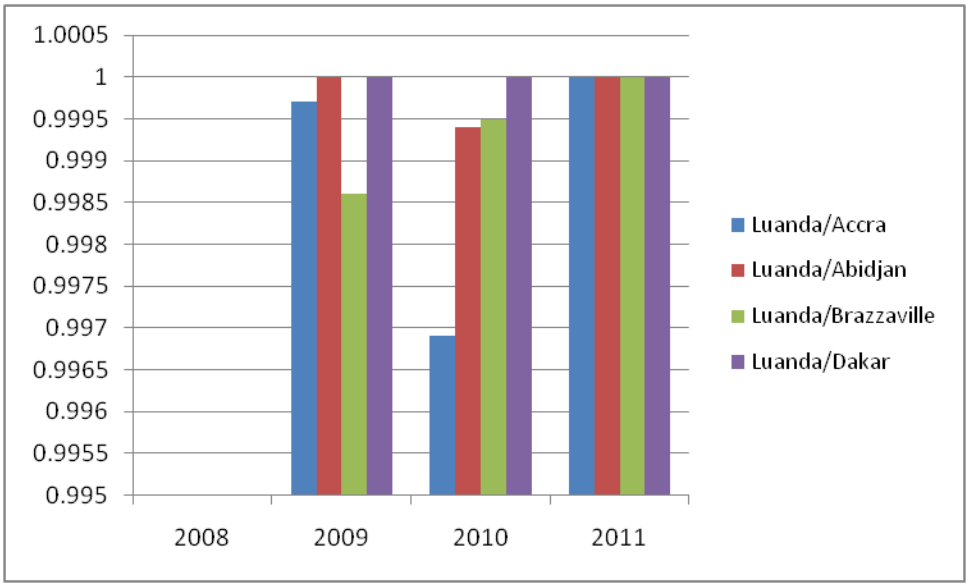
2.6. The table below shows the circuit availability achieved for those MCPC circuits interconnecting the NAFISAT and AFISNET VSAT networks.

NAFISAT MCPC Inter-operability		2008	2009	2010	2011
	Addis/Niamey		99.83%	99.99%	100%
	Khartoum/N'Djamena		99.89%	100%	100%
	Tripoli/N'Djamena		99.66%	100%	100%
	Tripoli/Niamey		99.44%	99.88%	100%
	Nairobi/Brazzaville		99.73%	100%	100%



2.6. The table below shows the circuit availability achieved for those MCPC circuits interconnecting the SADC VSAT II and AFISNET VSAT networks

SADC VSAT II MCPC Inter-operability		2008	2009	2010	2011
	Luanda/Accra		99.97%	99.69%	100%
	Luanda/Abidjan		100%	99.94%	100%
	Luanda/Brazzaville		99.86%	99.95%	100%
	Luanda/Dakar		100%	100%	100%



3. CONCLUSION

The meeting is invited to:

3.1. Note that 100% integration and interoperability has been achieved between the SADC VSAT II, NAFISAT and AFISNET VSAT networks.

3.2. Note the information provided in this working paper.

3.3. Take the information into account during discussions.

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